

Modeling the Critical Velocity Ionization Experiment Interaction

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Proper interpretation of critical velocity ionization experiments depends upon understanding the expected results from in-situ or remote sensors. In particular, the 1991 shuttle based CIV experiment had diagnostics 'inside' the neutral /plasma cloud created by the gas release subsystem. This paper focuses on determining the plasma density, temperature, and potentials which can be expected at such a measurement location. The dependence of the measurements on enhanced ionization in such a cloud is also considered. A three-dimensional electromagnetic Particle-in-Cell code with Monte-Carlo charged particle-neutral collisions has been developed. The simulation is set to be consistent with the CIV experiment configuration in question. The code is utilized to determine the expected plasma conditions at the orbiter location for various induced ionization rates. Time dependent studies of electron density and potential at the probe location are performed and compared with observations.